

CLAIMS

1. A light-emitting device comprising a first thin film transistor and a second thin film transistor, each of the first thin film transistor and the second thin film transistor comprising:

5 a gate electrode comprising a conductive material;
 a gate insulating layer formed over the gate electrode;
 a semiconductor film formed over the gate insulating layer; and
 a source wiring and a drain wiring formed over the semiconductor
 film,

10 wherein one of the source wiring and the drain wiring of the first thin film transistor is connected to the gate electrode of the second thin film transistor,
 and the semiconductor film does not extend beyond an edge of the gate insulating layer.

15 2. A light-emitting device comprising a first thin film transistor and a second thin film transistor, each of the first thin film transistor and the second thin film transistor comprising:

 a gate electrode comprising a conductive material;
 a gate insulating layer formed over the gate electrode;
20 a semiconductor film formed over the gate insulating layer; and
 a source wiring and a drain wiring formed over the semiconductor
 film,

 wherein one of the source wiring and the drain wiring of the first thin film transistor is connected to the gate electrode of the second thin film transistor,
25 and an edge of the semiconductor film is aligned with an edge of the gate insulating layer.

3. A light-emitting device comprising a switching thin film transistor and a driving thin film transistor, the switching thin film transistor comprising:

30 a first gate electrode comprising a conductive material;

a first island-like gate insulating layer in contact with the first gate electrode;

5 a first island-like semiconductor film in contact with the first island-like gate insulating layer;

wherein the first island-like semiconductor film does not extend beyond an edge of the first island-like gate insulating layer;

10 at least two second semiconductor films including one conductivity type impurity in contact with the first island-like semiconductor layer; and

a source wiring and a drain wiring in contact with the second semiconductor films;

and the driving thin film transistor comprising:

15 a second gate electrode comprising the conductive material;

a second island-like gate insulating layer in contact with the second gate electrode; and

a third island-like semiconductor film in contact with the second island-like gate insulating layer,

wherein the third island-like semiconductor film does not extend beyond an edge of the second island-like gate insulating layer

wherein a portion of the second gate electrode is exposed,

20 and one of a source wiring and a drain wiring of the switching thin film transistor is connected to the gate electrode of the driving thin film transistor,

4. A light-emitting device comprising a switching thin film transistor and a driving thin film transistor, the switching thin film transistor comprising,

25 a first gate electrode comprising a conductive material;

a first island-like gate insulating layer in contact with the first gate electrode;

a first island-like semiconductor film in contact with the first island-like gate insulating layer;

30 wherein an edge of the first island-like semiconductor film is aligned with an

edge of the first island-like gate insulating layer;

at least two second semiconductor films including one conductivity type impurity in contact with the first island-like semiconductor layer; and

5 a source wiring and a drain wiring in contact with the second semiconductor films;

and the driving thin film transistor comprising:

a second gate electrode comprising the conductive material;

a second island-like gate insulating layer in contact with the second gate electrode;

10 a third island-like semiconductor film in contact with the second island-like gate insulating layer;

wherein an edge of the third island-like semiconductor film is aligned with an edge of the second island-like gate insulating layer;

wherein a portion of the second gate electrode is exposed,

15 and one of the source wiring and the drain wiring of the switching thin film transistor is connected to the gate electrode of the driving thin film transistor,

5. A light-emitting device comprising a first thin film transistor and a second thin film transistor, each of the first thin film transistor and the second thin film 20 transistor comprising:

a base film;

a gate electrode comprising a conductive material in contact with the base film;

a gate insulating layer formed over the gate electrode;

25 a semiconductor film formed over the gate insulating layer; and

a source wiring and a drain wiring formed over the semiconductor film,

wherein the semiconductor film does not extend beyond an edge of the gate insulating layer,

30 and one of the source wiring and the drain wiring of the first thin film transistor

is connected to the gate electrode of the second thin film transistor.

6. A light-emitting device comprising a first thin film transistor and a second thin film transistor, each of the first thin film transistor and the second thin film transistor comprising:

- 5 a base film;
- 10 a gate electrode comprising a conductive material in contact with the base film;
- 15 a gate insulating layer formed over the gate electrode;
- 20 a semiconductor film formed over the gate insulating layer; and
- 25 a source wiring and the drain wiring formed over the semiconductor film,

wherein an edge of the semiconductor film is aligned with an edge of the gate insulating layer,

15 and one of the source wiring and the drain wiring of the first thin film transistor is connected to the gate electrode of the second thin film transistor.

7. A light-emitting device comprising a switching thin film transistor and a driving thin film transistor, the switching thin film transistor comprising,

- 20 a base film;
- 25 a first gate electrode comprising a conductive material in contact with the base film;
- 30 a first island-like gate insulating layer in contact with the first gate electrode;
- 35 a first island-like semiconductor film in contact with the first island-like gate insulating layer;
- 40 wherein the first island-like semiconductor film does not extend beyond an edge of the first island-like gate insulating layer;
- 45 a second semiconductor film including one conductivity type impurity in contact with the first island-like semiconductor layer; and

a source wiring and a drain wiring in contact with the second semiconductor film;
and the driving thin film transistor comprising:
a base film;
5 a second gate electrode comprising the conductive material in contact with the base film;
a second island-like gate insulating layer in contact with the second gate electrode;
a third island-like semiconductor film in contact with the second 10 island-like gate insulating layer;
wherein the third island-like semiconductor film does not extend beyond an edge of the second island-like gate insulating layer,
wherein a portion of the second gate electrode is exposed,
and one of the source wiring and the drain wiring of the switching thin film 15 transistor is connected to the gate electrode of the driving thin film transistor.

8. A light-emitting device comprising a switching thin film transistor and a driving thin film transistor, the switching thin film transistor comprising:

a base film;
20 a first gate electrode comprising a conductive material in contact with the base film;
a first island-like gate insulating layer in contact with the first gate electrode;
a first island-like semiconductor film in contact with the first 25 island-like gate insulating layer;
wherein an edge of the first island-like semiconductor film is aligned with an edge of the first island-like gate insulating layer;
at least two second semiconductor films including one conductivity type impurity in contact with the first island-like semiconductor layer; and
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a source wiring and a drain wiring in contact with the second semiconductor films;

and the driving thin film transistor comprising:

a base film;

5 a second gate electrode comprising the conductive material in contact with the base film;

a second island-like gate insulating layer in contact with the second gate electrode; and

10 a third island-like semiconductor film in contact with the second island-like gate insulating layer,

wherein an edge of the third island-like semiconductor film is aligned with an edge of the second island-like gate insulating layer;

wherein a portion of the second gate electrode is exposed,

one of the source wiring and the drain wiring of the switching thin film 15 transistor is connected to the second gate electrode of the driving thin film transistor.

9. The light-emitting device according to any one of Claims 1, 2, 5 and 6, wherein a protective film is formed over the semiconductor film.

20 10. The light-emitting device according to any one of Claims 3, 4, 7 and 8, wherein a protective film is formed over at least one of the first island-like semiconductor film and the third island-like semiconductor film.

11. The light-emitting device according to any one of Claims 1 to 8, wherein 25 the conductive material comprises Ag, Au, Cu, W or Al as a main component.

12. The light-emitting device according to any one of Claims 1, 2, 5 and 6, wherein the semiconductor film includes hydrogen and a halogen element, and a semiconductor having a crystal structure, and a TFT that can operate with an electron 30 field-effect mobility of 1 to 15cm²/V·sec.

13. The light-emitting device according to any one of Claims 3, 4, 7 and 8, wherein at least one of the first island-like semiconductor film and the third island-like semiconductor film includes hydrogen and a halogen element, and a semiconductor 5 having a crystal structure, and a TFT that can operate with an electron field-effect mobility of 1 to $15\text{cm}^2/\text{V}\cdot\text{sec}$.

14. An electronic device having the light-emitting device according to any one of Claims 1 to 8.

10 15. The electronic device according to claim 14, wherein said electronic device is selected from the group consisting of: a television receiver, a personal computer, a portable telephone, an information display board and an advertisement display board.

15 16. A method of manufacturing a light-emitting device comprising the steps of: forming a gate electrode by a droplet discharging method over a substrate; forming a gate insulating layer and a first semiconductor film over the gate electrode;

20 forming a first mask by a droplet discharging method over the first semiconductor film;

etching the semiconductor film and the gate insulating layer continuously with the first mask to form a patterned gate insulating film and a patterned first semiconductor film;

removing the first mask;

25 forming a protective layer over the patterned first semiconductor film after removing the first mask;

forming a second semiconductor film including one conductivity type impurity over the patterned first semiconductor film and the protective layer;

30 forming a source wiring and a drain wiring by a droplet discharging method over the second semiconductor film; and

etching the second semiconductor film over the protective layer by the source wiring and the drain wiring as a second mask.

17. A method of manufacturing a light-emitting device comprising the steps of:

5 forming a gate electrode of a switching thin film transistor and a gate electrode of a driving thin film transistor by a droplet discharging method over a substrate;

forming a gate insulating layer and a first semiconductor film over the gate electrode of the switching thin film transistor and the gate electrode of the driving thin film transistor;

10 forming a first mask by a droplet discharging method over the first semiconductor film;

etching the first semiconductor film and the gate insulating layer continuously with the first mask to form a patterned gate insulating film and a patterned first semiconductor film and to expose a portion of the gate electrode of the driving thin film transistor;

15 removing the first mask;

forming a protective layer over the patterned first semiconductor film after removing the first mask;

forming a second semiconductor film including one conductivity type impurity;

20 forming a source wiring and a drain wiring by a droplet discharging method, at the same time, and connecting at least one of the source wiring and the drain wiring to the gate electrode of the driving thin film transistor; and

etching the second semiconductor film over the protective layer by the source wiring and the drain wiring as a second mask.

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18. The method of manufacturing a light-emitting device according to Claim 16 or 17, wherein the step of forming the gate insulating film and the first semiconductor film over the gate electrode is performed continuously without being exposed to an air.

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19. A method of manufacturing a light-emitting device comprising the steps of: forming a gate electrode by a droplet discharging method over a substrate having an insulating surface or a substrate having a base surface that is exposed to a pretreatment;

5 forming a base film over the gate electrode as a pretreatment; forming a gate insulating layer and a first semiconductor film over the base film forming a first mask by a droplet discharging method over the first semiconductor film;

10 etching the first semiconductor film and the gate insulating layer continuously with the first mask to form a patterned gate insulating film and a patterned first semiconductor film;

removing the first mask;

15 forming a protective layer over the patterned first semiconductor film after removing the first mask;

forming a second semiconductor film including one conductivity type impurity; forming a source wiring and a drain wiring by a droplet discharging method; and

20 etching the second semiconductor film over the protective layer by the source wiring and the drain wiring as a second mask.

20. A method of manufacturing a light-emitting device comprising the steps of: forming a gate electrode of a switching thin film transistor and a gate electrode of a driving thin film transistor by a droplet discharging method over a substrate;

25 forming a base film over the gate electrode of the switching thin film transistor and the gate electrode of the driving thin film transistor as a pretreatment;

forming a gate insulating layer and a first semiconductor film over the base film;

30 forming a first mask by a droplet discharging method over the first semiconductor film;

etching the first semiconductor film and the gate insulating layer continuously with the first mask to form a patterned gate insulating film and a patterned first semiconductor film and to expose a portion of the gate electrode of the driving thin film transistor;

5 removing the first mask;

 forming a protective layer over the patterned first semiconductor film after removing the first mask;

 forming a second semiconductor film including one conductivity type impurity;

10 forming a source wiring and a drain wiring by a droplet discharging method, at the same time, and connecting one of the source wiring and the drain wiring to the gate electrode of the driving thin film transistor; and

 etching the second semiconductor film over the protective layer by the source wiring and the drain wiring as a second mask.

15 21. The method of manufacturing a light-emitting device according to Claim 19 or 20, wherein the step of forming the gate insulating film and the first semiconductor film over the base film is performed continuously without being exposed to an air.

20 22. The method of manufacturing a light-emitting device according to any one of Claims 16, 17, 19 and 20, wherein the gate insulating layer is formed by sequentially laminating a first silicon nitride film, a silicon oxide film and a second silicon nitride film.

25 23. The method of manufacturing a light-emitting device according to any one of Claims 16, 17, 19 and 20, wherein said substrate has an insulating surface.

 24. The method of manufacturing a light-emitting device according to any one of Claims 16, 17, 19 and 20, wherein said substrate has a pretreated base surface.